



**STATISTICS 410-3**  
**STATISTICAL ANALYSIS OF SAMPLE SURVEYS**

**Spring 2005**  
**DAY COURSE**

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*Students requiring accommodations as a result of disability, must contact the Centre for Students with Disabilities 604-291-3112 or csdo@sfu.ca*

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**Instructor: Wen Lu**

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**Prerequisite:**

STAT 350

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**Textbook:**

*Sampling Design and Analysis* by Sharon Lohr, published by Duxbury Press.

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**Calendar Description:**

An introduction to the major sample survey designs and their mathematical justification. Associated statistical analyses.

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**Outline:**

This course develops the statistical theory required for constructing and analyzing complex sample surveys. Applications to be discussed may include e.g., the Gallup Poll, market surveys, the Canadian Labour Force Survey, and forest surveys.

1. **The Role of Randomization in Sample Surveys:** Bias, standard error, and root mean squared error, survey terminology.
  2. **Simple Random Sampling:** Using random number generators and tables to take a simple random sample, the sampling frame, estimating means, totals, and proportions, the finite population correction factor, confidence limits, problems with the use of the normal approximation, choosing the sample size.
  3. **Stratified Random Sampling:** Advantages of stratification, estimating gains in precision, confidence limits, optimal sample sizes, effects of errors in calculated stratum sizes and in optimal allocation, stratification after selection.
  4. **Ratio and Regression Estimates:** Purpose and examples, bias, standard error, confidence limits, optimal conditions, optimal allocation, weak dependence on usual regression assumptions.
  5. **Systematic Sampling:** A brief survey of the models required to estimate the variance, and of potential advantages and disadvantages.
  6. **Cluster and Multi-Stage Sampling:** Purpose and examples, comparison estimators, equal- vs. unequal-probability sampling, optimal choice of sampling fractions and probabilities.
  7. **Double Sampling:** An overview of the role of double sampling in constructing stratified, ratio, and regression estimates; sampling on two or more occasions.
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**Grading Scheme:**

A grading scheme will be announced by the instructor at the first lecture.

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*Students should be aware that they have certain rights to confidentiality concerning the return of course papers and the posting of marks. Please pay careful attention to the options discussed in class at the beginning of the semester. Students are reminded that Academic Honesty is a cornerstone of the acquisition of knowledge. Scholarly integrity is required of all members of the University. Please consult the General Guidelines of the calendar for more details.*

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Revised October 2004